WHAT IS CLAIMED IS:

1. A vibration suppressing apparatus for suppressing a vibration of an internal combustion engine caused during a cranking of the internal combustion engine by a motor, comprising:

a rotational phase detector that detects a rotational phase of a crankshaft of the internal combustion engine; and

a controller that controls an operation of the motor that cranks the internal combustion engine based on the detected rotational phase of the crankshaft detected by the rotational phase detector so that an output torque of the motor fluctuates during the cranking similarly to a fluctuation in a resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

2. A method for suppressing a vibration of an internal combustion engine caused during a cranking of the internal combustion engine by a motor, comprising:

detecting a rotational phase of a crankshaft of the internal combustion engine; and

controlling an operation of the motor that cranks the internal combustion engine, based on the detected rotational phase of the crankshaft, so that an output torque of the motor fluctuates during the cranking similarly to a fluctuation in a resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

3. A vibration suppressing apparatus for suppressing a vibration of an internal combustion engine caused by a cranking of the internal combustion engine performed by a motor, comprising:

a rotational phase detector that detects a rotational phase of a crankshaft of the internal combustion engine; and

a controller that controls an operation of the motor based on the detected rotational phase of the crankshaft detected by the rotational phase detector so that an output torque of the motor fluctuates during the cranking similarly to a fluctuation in a resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft, the fluctuation in the resistance torque including at least a fluctuation in a resistance torque caused by compression of an intake air by the internal combustion engine.

4. The vibration suppressing apparatus according to claim 3, wherein the fluctuation in the resistance torque compensated for by the controller further includes a fluctuation in an internal combustion engine inertia resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

5. The vibration suppressing apparatus according to claim 4, wherein the fluctuation in the resistance torque compensated for by the controller further includes a fluctuation in an internal combustion engine friction resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

6. The vibration suppressing apparatus according to claim 5, wherein the controller estimates the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

7. The vibration suppressing apparatus according to claim 5, wherein the controller adjusts the rotational phase of the crankshaft occurring at a beginning of the cranking to a predetermined phase.

8. The vibration suppressing apparatus according to claim 3, wherein the fluctuation in the resistance torque compensated for by the controller further includes a fluctuation in an internal combustion engine friction resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

9. The vibration suppressing apparatus according to claim 8, wherein the controller estimates the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

10. The vibration suppressing apparatus according to claim 3, wherein the controller estimates the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

11. The vibration suppressing apparatus according to claim 3, wherein the controller adjusts the rotational phase of the crankshaft occurring at a beginning of the cranking to a predetermined phase.

12. The vibration suppressing apparatus according to claim 3, wherein the controller controls the operation of the motor so that a rotation angular acceleration of the crankshaft with respect to the rotational phase of the crankshaft follows a predetermined schedule.

13. A method for suppressing a vibration of an internal combustion engine caused by a cranking of the internal combustion engine performed by a motor, comprising:

detecting a rotational phase of a crankshaft of the internal combustion engine; and

controlling an operation of the motor, based on the detected rotational phase of the crankshaft, so that an output torque of the motor fluctuates during the cranking similarly to a fluctuation in a resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft, the fluctuation in the resistance torque including at least a fluctuation in a resistance torque caused by compression of an intake air by the internal combustion engine.

14. The method according to claim 13, wherein the fluctuation in the resistance torque also includes a fluctuation in an internal combustion engine inertia resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

15. The method according to claim 14, wherein the fluctuation in the resistance torque also includes a fluctuation in an internal combustion engine friction resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

16. The method according to claim 15, wherein the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft is determined by an estimation.

17. The method according to claim 16, further comprising adjusting the rotational phase of the crankshaft occurring at a beginning of the cranking to a predetermined phase.

18. The method according to claim 13, wherein the fluctuation in the resistance torque also includes a fluctuation in an internal combustion engine friction resistance torque exerted on the crankshaft against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft.

19. The method according to claim 18, wherein the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft is determined by an estimation.

20. The method according to claim 13, wherein the fluctuation in the resistance torque against the cranking of the internal combustion engine that the crankshaft presents in accordance with the rotational phase of the crankshaft is determined by an estimation.

21. The method according to claim 13, further comprising adjusting the rotational phase of the crankshaft occurring at a beginning of the cranking to a predetermined phase.

22. The method according to claim 13, further comprising:

detecting a rotation angular acceleration of the crankshaft with respect to the rotational phase of the crankshaft; and

controlling the operation of the motor so that the rotation angular acceleration follows a predetermined schedule.